

REMARKS/ARGUMENTS

Claims 18-24 and 30-32 are pending. Claims 18 and 21-24 were rejected under 35 USC 103(a). Dependent claims 19 and 20 are indicated as allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 30-32 are indicated as allowable. Claims 18 and 19 are amended and claim 20 is canceled.

Claim 18 is amended to correct inadvertent drafting errors and to more clearly set forth the invention. Support for the claim 18 amendments can be found throughout the specification and the drawings. For example, support for the amendment "forming first and second charge control electrodes ... along a dimension parallel to flow of current" can be found in at least Figs. 1 and 6. In Fig. 1, electrodes 212(a) and 212(b) are formed along the vertical dimension which is parallel to current flow between source 242 and drain 226. Similarly, in Fig. 6, electrodes 414(a) and 414(b) are formed along the horizontal dimension parallel to the current flow between drain region 428 and source region 432.

Claim 19 is rewritten in independent form, and includes all the limitations of its base claim 18 as well as the limitations of the canceled claim 20. Claim 19 is believed to be in condition for allowance.

Claim rejection under 35 USC 103(a)

Claims 18 and 21-24 were rejected under 35 USC 103(a) as being unpatentable over Tihanyi (US6,362,505, hereinafter "Tihanyi") and Trujillo et al. (US6,566,804, hereinafter "Trujillo"). This rejection is respectfully traversed.

Claim 18 as amended distinguishes over Tihanyi and Trujillo taken singly or in combination at least by reciting forming two charge control electrodes along a dimension parallel to flow of current, wherein the two charge control electrodes are adapted to be biased differently from one another. Figs. 1 and 6 of the present application will be used to illustrate two exemplary embodiments covered by the above-referenced limitations of claim 18, which use is not intended to be limiting. In Fig. 1, electrodes 212(a) and 212(b) are formed along the vertical

dimension which is parallel to the flow of current between source region 232 and drain region 218. Similarly, in Fig. 6, electrodes 414(a) and 414(b) are formed along the horizontal dimension parallel to the current flow between drain region 428 and source region 432. Electrodes 212(a) and 212(b) in Fig. 1 and electrodes 414(a) and 414(b) are adapted such that they can be biased differently from one another.

In contrast, in Figs. 1-3 of Tihanyi, electrodes 12 are formed along the horizontal dimension and are thus perpendicular to the vertical flow of current between source 10 and drain 2. Further, electrodes 12 are all connected to well region 6 and are thus biased to the same potential. Thus, Tihanyi fails to teach or suggest forming two charge control electrodes along a dimension parallel to the flow of current, wherein the two charge control electrodes are adapted to be biased differently from one another.

In the Office action, the Examiner relies on Trujillo to address the deficiency of Tihanyi with respect to the claim 18 limitation “the first charge control electrode is adapted to be biased differently than the second charge control electrode.” This is respectfully traversed because, although Trujillo shows two electrodes 152 and 158 which may be biased differently from one another, the Trujillo device is both structurally and functionally vastly different from the Tihanyi devices as well as the claimed semiconductor device, and as such no motivation can be found to combine Trujillo with Tihanyi.

First, Trujillo nowhere teaches or suggests many of the limitations in applicant’s claim 18. For example, Trujillo fails to teach “forming a second region of a second conductivity type in the semiconductor substrate such that the first and second regions form a p-n junction,” recited in claim 18. There are no p-n junctions in the Trujillo device. As another example, Trujillo fails to teach “forming first and second charge control electrodes adjacent to but insulated from one of the first and second regions.” In Trujillo, electrodes 152 and 158 in Fig. 2 are formed along a surface of transparent substrate 112 and a surface of back plate 122, respectively. Thus, electrodes 152 and 158 are not formed adjacent to one of two regions which together form a p-n junction in a substrate, as recited in applicant’s claim 18.

Second, Trujillo can not be combined with Tihanyi because these two references are directed to non-analogous technologies, and in addition, no motivation for combining the two

references can be found. Tujillo is directed to field emission devices (FEDs) which are both structurally and operationally quite distinct from the Tihanyi devices. As described in column 1, lines 18-24 of Trujillo, the FEDs shown in Figs. 1 and 2 include a cathode plate 110; an anode plate 120, and a sealant 130, which are configured to provide a thin envelop. Cathode plate 110 and anode plate 120 are spaced apart to define an interspace region 111 which is evacuated to a particular pressure. As further described in column 2, lines 1-8, during operation of the FEDs, a cathode voltage (applied to cathode 113 via voltage source 132), a gate voltage (applied to gate 119 via voltage source 134), and an anode voltage (applied to anode 124 via voltage source 136) are selected to cause an electron current 138 to flow between the anode and the cathode through the evacuated interspace region 111. This FED device structure and its method of operation are substantially distinct from the structure and method of operation of the Tihanyi devices. For example, none of the Tihanyi devices include an evacuated space through which current can flow. Instead, the current in the Tihanyi devices flows through silicon region 3 (Figs. 1-4). For the above reasons, it is believed that the FED device in Trujillo and the devices in Tihanyi are directed to non-analogous technologies.

Further, as described in column 3, lines 27-52 of Trujillo, electrode 152 in Fig. 2 of Trujillo is incorporated in the FED device and biased to cause charges 144 accumulated in back plate 112 below the ballast resistor 114 to be moved from the lower surface 146 (see charges 144 in Fig. 1) of back plate 112 to its upper surface 155 (see charges 144 in Fig. 2). Similarly, electrode 158 in Fig. 2 of Trujillo is incorporated in the FED device to cause charges 150 accumulated at the left side 148 of anode plate 120 to be moved from the lower surface 153 (see charge 150 in Fig. 1) of anode plate 120 to its upper surface 159 (see charge 150 in Fig. 2). Because, the Tihanyi devices are structurally and operationally completely distinct from Trujillo's FED, the concerns about the impact of the accumulated charges 144 and 150 (Figs. 1 and 2) on the performance of the Trujillo FED are not present in the Tihanyi devices. Accordingly, there would be no motivation to combine the two electrodes 152 and 158 in the manner taught by Trujillo with any of the Tihanyi devices.

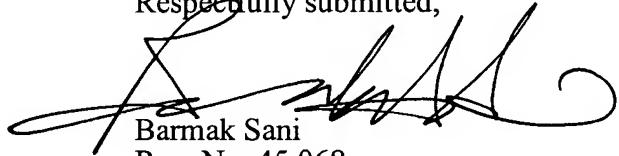
Therefore, claim 18 as amended and its dependent claims distinguish over Tihanyi and Trujillo at least for the reasons stated above.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,



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